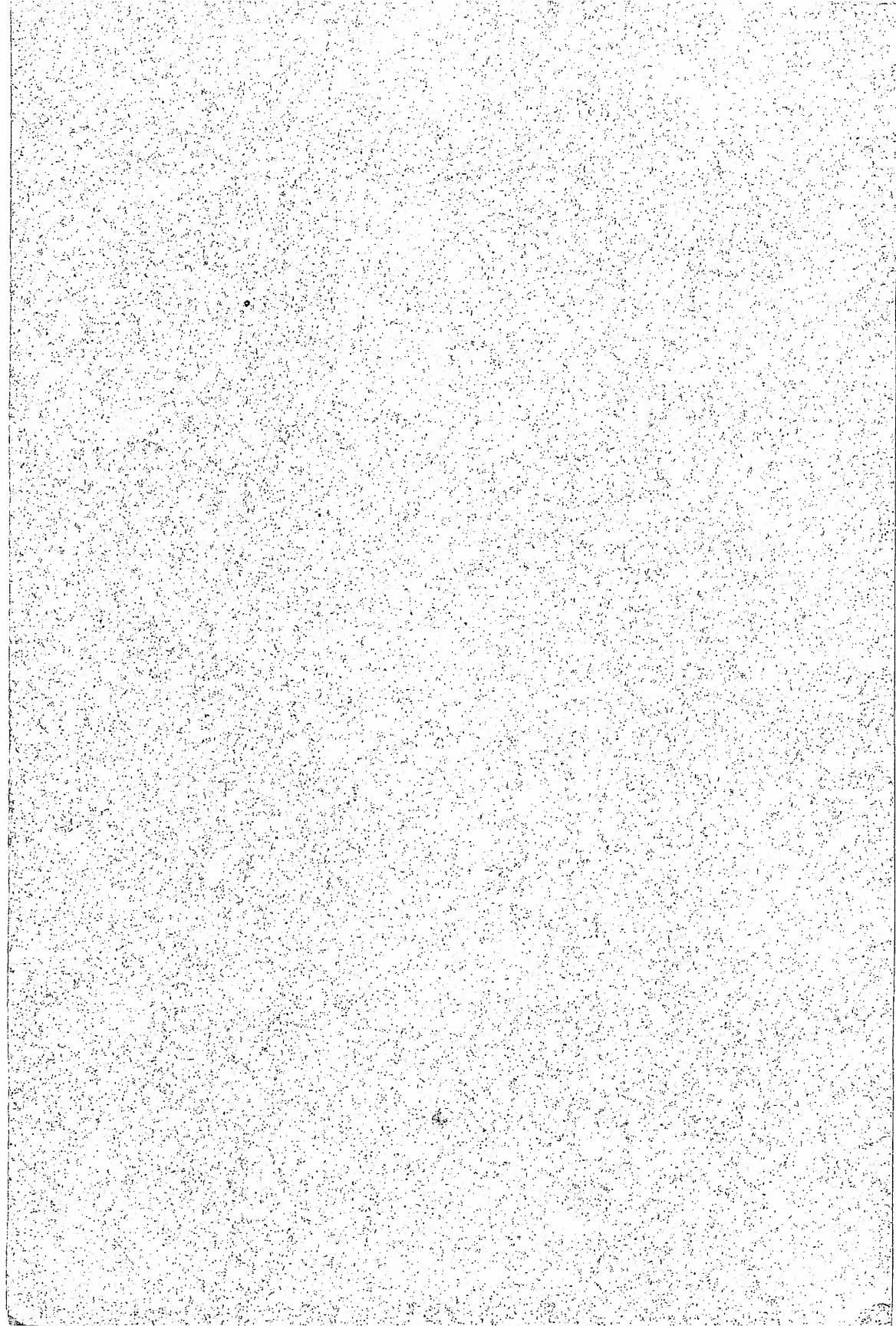


OBIS  
POND GUIDE



# OBIS POND GUIDE

A guide for identifying organisms  
found in and around the pond and  
other freshwater sites



Developed by  
Outdoor Biology Instructional Strategies  
Lawrence Hall of Science  
University of California  
Berkeley, California 94720

Published by  
Delta Education, Inc.  
Hudson, New Hampshire

---

Author

Dave Buller

Illustrators

Lonnie Kennedy  
Lisa Haderlie Baker

Editor

Kay Fairwell

The material was prepared with the support of National Science Foundation Grant No. SED72-05823. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the authors and do not necessarily reflect the views of NSF.

Copyright 1980 by The Regents of the University of California. Except for the rights to materials reserved by others, the Publisher and the Copyright owner hereby grant permission without charge to domestic persons of the United States and Canada for use of this Work and related materials in the English language in the United States and Canada after December 31, 1986. For conditions of use and permission to use the Work or any part thereof for foreign publications or publications in other than the English language, apply to The Regents of the University of California or Delta Education. Publication pursuant to any permission shall contain an acknowledgement of this copyright and an acknowledgement and disclaimer statement such as the one that appears above.

Published by Delta Education, Inc., P.O. Box 915, Hudson, New Hampshire 03051

---



BULLFROG TADPOLE



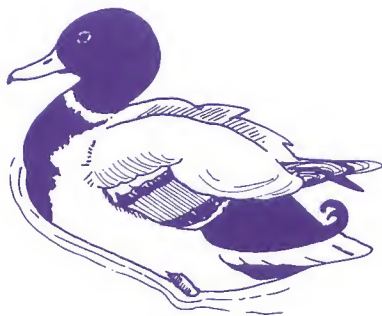
## PREFACE

Outdoor Biology Instructional Strategies (OBIS) is a program with a variety of outdoor activities for youngsters to enjoy. While engaged in these activities, youngsters also learn more about the environment in which they live. OBIS activities emphasize interactions of organisms with each other and with their environment. The activities are also concerned with interactions of people with their environment.

This guide was written to aid people in their interaction with organisms in and around ponds and other freshwater sites. The guide is designed for quick, easy identification of some of the most commonly encountered freshwater organisms. Only those organisms readily observed by the unaided eye, or by means of a simple magnifying lens, have been included.

References are listed at the end of the guide. Both the artists and the author express their gratitude to the authors of the consulted works. Those desiring more information about freshwater organisms would do well to refer to these publications.

**Ecological Note:** This guide was produced as an aid to the study and appreciation of aquatic life. We ask the users of this guide to do their best to leave the ponds and other freshwater systems they study as they found them. In this way, others who follow may find the same pleasure in the sites.



# OBSERVING AQUATIC ORGANISMS

The best way to observe organisms is in their natural settings. If you have difficulty in your attempts at observation, a net will help you locate and catch organisms. Placing animals in a plastic bag or milk carton filled with water is a good way to observe them. Change the water in observation containers frequently and avoid crowding a container with animals. A hand lens is useful for observing tiny organisms or parts of organisms. Be sure to replace organisms after you have finished your observations.

## HOW TO USE THIS GUIDE

### The Animal Section

This guide splits the animal kingdom into two divisions: invertebrates (animals without backbones) and vertebrates (animals with backbones). The animal groups in each division have been organized by phyla or class. In some cases (arthropods and mammals, for instance), groups have been broken down further into orders and families. Common names have been used for the various animal groups instead of their scientific names.

### The Plant Section

The plant section has been organized by growing zones: shore, emergent, floating, and submerged plants.

### The Format of the Guide

The small size of this guide allows you to flip pages until you locate the desired illustration. You can then check the text to verify the identification.

Size scales have been included with some animals as an aid to identification. The size scales represent the minimum and maximum body lengths of all the members of a particular order (leeches) or family (damselflies) of animals. Antennae and tail parts have not been included in these scales. For most of the smaller animals, a scale-size drawing has been included along with the illustrations.

### What the Body-Size Scales Mean



# TABLE OF CONTENTS

Preface	iii
Observing Aquatic Organisms	iv
How to Use this Guide	iv
OBIS Freshwater Activities	2
ANIMALS	3
Invertebrates	3
Vertebrates	11
PLANTS	13
Shore Plants	13
Emergent Plants	14
Floating Plants	15
Submerged Plants	17
Bibliography	18



# OBIS FRESHWATER ACTIVITIES

You will find the *OBIS Pond Guide* useful for these activities.

*Animal Movement in Water*

*Attract a Fish*

*Can Fishing*

*Crawdadd Grab*

*Damsels and Dragons*

*Great Streamboat Race*

*Habitats of the Pond*

*Hold It*

*Hopper Circus*

*How Many Organisms Live Here?*

*Night Shine*

*OBIS Oil Spill*

*Too Many Mosquitoes*

*Water Breathers*

*Water Holes to Mini-Ponds*

*Water Snails*

*Water Striders*

*What Lives Here?*



♀ MOSQUITO FISH (X2)



# ANIMALS

## INVERTEBRATES

Invertebrates are animals without backbones. They comprise 95% of the animal kingdom as far as numbers of species are concerned. The invertebrates include one-celled animals, sponges, coelenterates (jellyfish), worms and leeches, mollusks (snails and clams), arthropods (crustaceans, arachnids, insects), echinoderms (starfish and sea urchins), and other animal groups.

## COELENTERATES

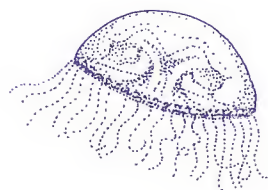
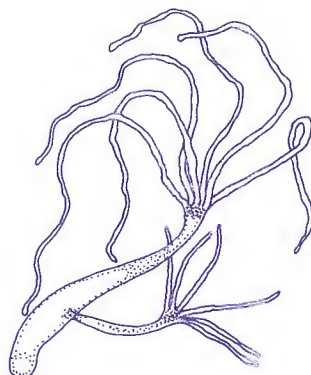
Coelenterata means hollow gut and refers to the fact that the main cavity of the body is the digestive cavity. Coelenterates include hydras, jellyfish, sea anemones, and corals. Most coelenterates are marine.

### Hydras

Hydras have starlike bodies with tentacles (tiny arms) encircling their mouths. The hydra looks like a half-inch piece of string with one end frayed out into several strands.

### Freshwater Jellyfish

These jellyfish have transparent (clear), bell-shaped bodies with many tentacles (tiny arms) surrounding their mouths. These dime-sized animals swim by spreading and closing their bodies (as you would open and close an umbrella).

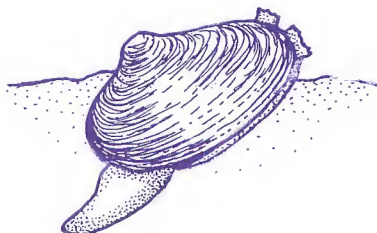


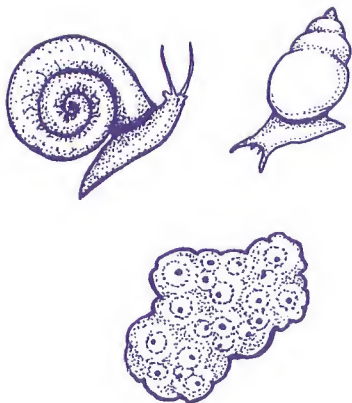
## MOLLUSKS

Mollusks possess soft bodies and usually a shell. The mollusks include mussels, clams, snails, slugs, squids, and the octopus.

### CLAMS AND MUSSELS

Clams and mussels are distinguished by two shells (bi-valved) hinged at the back.





## SNAILS

Snails usually have a single-coiled shell that may be rounded, flattened (like a wheel), or long and pointed.

## SNAIL EGGS

Snail eggs look like small, transparent sheets or capsules of jelly. If you look closely, you can see the developing snails (dark spots). Snail eggs are often attached to pondweeds, sticks, stones, or floating objects.

## SEGMENTED WORMS

Segmented (divided into parts) worms appear to be ringed. The earthworms, leeches, and tubifex worms belong in this group.

**LEECHES** |—————| MIN. MAX. 12"

Leeches are flattened, ringed worms that have both a tail and a mouth sucker. They feed on the blood of vertebrates and other invertebrates. Some species may reach over a foot in length.



**Tubifex Worms** |—————| MIN. MAX.

Tubifex worms are slender, reddish worms that live in the soft bottom mud. They construct dirt tubes out of which only the hind part of their bodies is extended.



**FLATWORMS** |—————| MIN. MAX.

Flatworms include flattened, unsegmented (unringed) worms such as the familiar Planaria. Many flatworms appear cross-eyed.



## ARTHROPODS

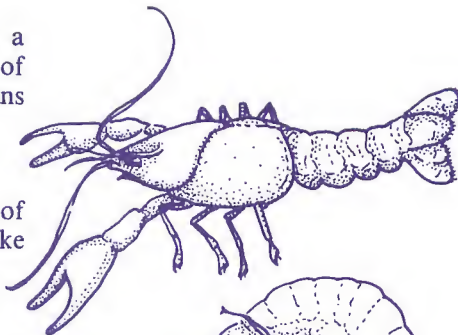
Arthropods are animals with jointed legs, segmented bodies, and an exoskeleton (hard, outer shell). Arthropods include crustaceans, arachnids, and insects.

## CRUSTACEANS

Crustaceans are primarily aquatic. They have a hard outer shell (exoskeleton) and two pairs of antennae. Nearly all crustaceans breathe by means of gills.

### Crayfish

Crayfish have five pairs of legs. The first pair of legs are large claws. Crayfish look and behave like miniature lobsters.



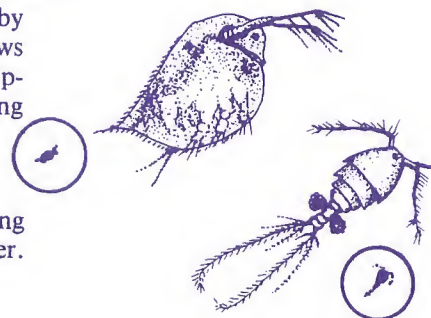
### Scuds

Scuds have arched backs and narrow bodies that are covered with many plates. They are also called side swimmers because they swim on their sides.



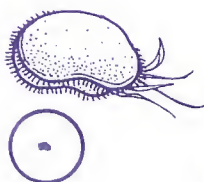
### Water Fleas

Water fleas are tiny crustaceans covered by transparent shells. Their internal structure shows up very clearly under magnification. The gut appears as a dark tube (j-shaped in *Daphnia*) running through the body length.



### Copepods

Copepods appear as little white specks darting through the water. They move in a jerky manner. Magnification shows them to be pear shaped.



### Seed Shrimp

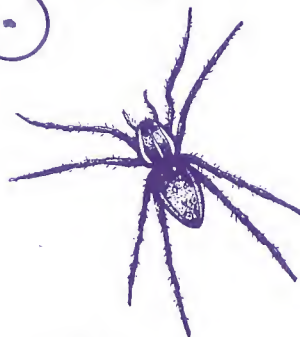
Seed shrimp are small crustaceans with two shells (bi-valved). They move by sticking their slender legs and antennae from between the shells and kicking rapidly.

## ARACHNIDS

Arachnids are members of the arthropod group that have eight legs. Arachnids include ticks, scorpions, spiders, and water mites.

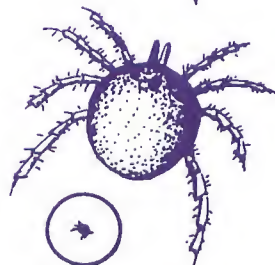
### SPIDERS

Spiders have bodies divided into two segments: a head and an abdomen. Fishing spiders can dive and remain under water for long periods of time because they trap and carry their own air supply on their abdomens.

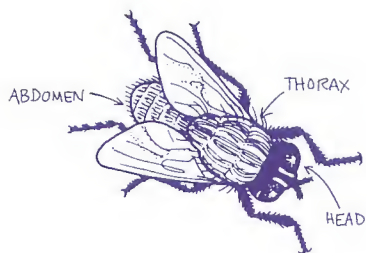


### WATER MITES

Water mites are usually no more than 5 mm long. Their bodies appear to be one piece. They commonly appear as brightly colored spots swimming or walking about in the water.





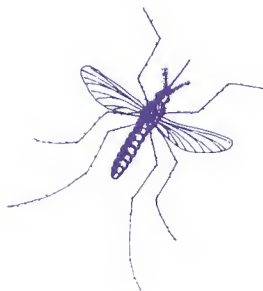


## INSECTS

Insects are the most successful group of animals, both in terms of numbers of species and total numbers. Adults have three body regions: head, thorax, and abdomen. The middle region (thorax) bears three pairs of jointed legs. The majority of insects are equipped with one or two pairs of wings.

### TRUEFLIES

Trueflies have only one pair of wings and include the mosquitoes, midges, crane flies, and houseflies.



#### Mosquitoes

Mosquitoes have one pair of transparent wings, and most are equipped with a long piercing and sucking tube for obtaining their food. A hand lens reveals that mosquito wings are fringed with tiny, colorful scales and hairs. Only females suck blood.



#### Mosquito Larvae

Mosquito larvae are commonly called wigglers because of the wiggling motion they make as they swim. Mosquito larvae appear hairier than midge-fly or crane fly larvae. Wigglers hang downward from the surface film and breathe by means of gills and an air tube.



#### Mosquito Pupae

Mosquito pupae look like large commas and move about using their flaplike tails. They usually last only a few days before the adult mosquitoes emerge.



#### Midgeflies

Midgeflies resemble mosquitoes but are usually smaller and more delicate. A hand lens shows that their wings are bare and not covered with scales as the wings of mosquitoes are.



#### Midgefly Larvae

Midgefly larvae are slender and wormlike, and many construct soft dirt cases around their bodies. Many midgeflies have larvae that are blood red in color and are commonly called blood worms.



#### Midgefly Pupae

Midgefly pupae are also slender, and they have slightly enlarged head regions. Midgefly pupae don't appear as hunched up as mosquito pupae.



### Craneflies



Craneflies, often mistaken for giant mosquitoes, don't bite and are quite harmless. They are long and slender, and their extremely long legs mark them as the "daddy long legs" among flies.



### Cranefly Larvae



Cranefly larvae are larger than either mosquito or midge fly larvae. They are usually brown, gray, or white, and often appear quite transparent. True crane fly larvae have a breathing disk at the end of their tails.



### Cranefly Pupae



Cranefly pupae are pale colored, sluggish, and do not eat. Most crane flies go to shore to pupate in soft, damp soil.



## WATER BUGS

Water bugs have jointed mouth parts for piercing and sucking. Most have two pairs of wings. The young water bug nymphs look like smaller models of the adults with shorter wings. All of the water bugs except the water boatmen have painful bites.

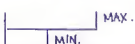
### Backswimmers



Backswimmers are unique among aquatic bugs in the respect that they always swim on their backs. Their backs are shaped like boat bottoms, and they use their long, oarlike hind legs to propel themselves through the water. Their bite is painful.



### Water Boatmen



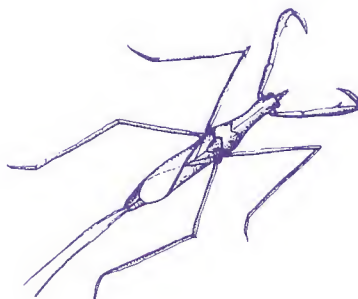
Water boatmen resemble backswimmers in shape but differ in that they swim on their stomachs and do not have a keeled underside. Like backswimmers, they propel themselves through the water with their long, oarlike hind legs. They eat mud, from which they extract algae. (The mud is then given off as waste.) Water boatmen do not bite.



### Water Scorpions



Water scorpions have a breathing tube that is formed when they press their two long, grooved tail filaments together. The water scorpion illustrated looks like an aquatic walking stick. The other type of water scorpion has a stout, oval-shaped body. Both types use their first pair of legs for seizing prey.





### Water Striders



Water striders are named after their ability to rapidly skim or skate on their spiderlike legs over the surface of the water. They are usually found in quiet or gently flowing water. They range in size from the tiny, broad-shouldered water striders with bodies about 3 mm long, to the large water striders whose bodies are 20 mm long. They rarely bite.

### Giant Water Bugs

Giant water bugs may reach 8 cm in length, making them the largest true bugs. They have wide, flat, oval bodies and can inflict a very painful bite. Their strong front legs are similar in form and action to the front legs of the water scorpions.

## BEETLES

Beetles make up one of the largest insect groups. They generally have four wings; but the thick, heavy, front pair serve as wing covers for the hind wings and as a protective back armor. Only a few species live in the water. Their larvae have three pairs of legs.



### Predaceous Diving Beetles



These beetles make up the major group of water beetles. They are usually observed with the tips of their abdomens at the water's surface and their heads below the surface. They have an oval, flattened shape, and their shiny compact bodies are generally black to brownish black. Diving beetles have slender, threadlike antennae. Their larvae are commonly called water tigers.



### Whirligig Beetles



These beetles are easily recognized from their whirling circling motion on the surface. The smooth form of their oval, flattened bodies is broken only by their front legs, which project from the sides of the body just behind the head. Their eyes are divided into two parts, allowing them to see both above and below the water at the same time. They are blue-black or brown in color.



### Scavenger Beetles



These beetles resemble diving beetles but can be easily distinguished by their short, club-shaped antennae. They also differ from diving beetles in that they rest in a heads-up position (rather than heads down) when they are at the surface.

## MISCELLANEOUS INSECTS

Miscellaneous insects are those insects that do not fit in the three preceding categories of insects (Trueflies, Water Bugs, or Beetles).

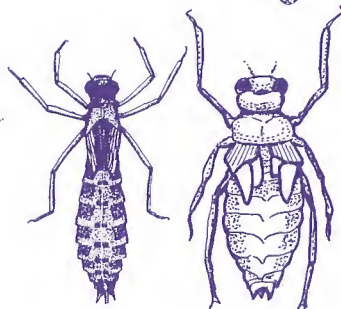
### Dragonflies

Dragonflies resemble crayons with four large wings, which are finely laced with veins. Dragonflies hold their wings in a horizontal position when resting.



### Dragonfly Nymphs

Dragonfly nymphs are usually dull-colored, slow-moving organisms that use a scooplike lip to capture their food. The dragonfly nymphs are generally larger and chunkier than damselfly nymphs. Two different kinds of dragonfly nymphs are illustrated here.



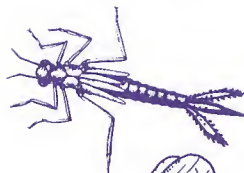
### Damselflies

Damselflies resemble matchsticks with four, veined wings. They are slimmer and more delicate looking than dragonflies. Damselflies hold their wings close together and pointing backwards when resting.



### Damselfly Nymphs

These nymphs are slimmer and more delicate looking than the dragonfly nymphs. Damselfly nymphs have three leaf-shaped gills at the tips of their abdomens.



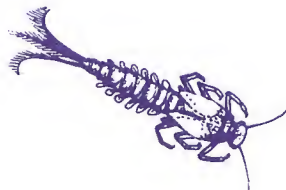
### Mayflies

Mayflies are delicate-looking insects that possess two or three long, threadlike strands projecting from the tips of their abdomens and four nearly transparent wings. When resting, mayflies hold their wings close together and pointing up.



### Mayfly Nymphs

These nymphs are similar to damselfly nymphs, but they have stouter legs; their featherlike tail flaps are usually longer; and they have paired gills, which look like small flaps, along their abdomens. The mayfly nymph lacks a scooplike lip for capturing food.



### Caddisflies

Caddisflies are mothlike insects with four soft, hairy wings and long, slender antennae.







### Caddisfly Larvae



These larvae live in little cases or tubes that they construct from pieces of wood, leaves, sand, and silt. Most caddisfly larvae build portable cases, which they drag about whenever they travel. During travel, only the front end of the body and the legs stick out from the case.



### Dobsonflies

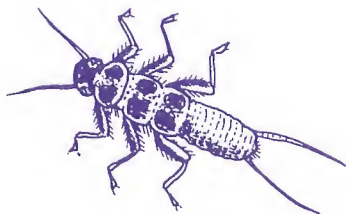


Dobsonflies are very large, brown insects with two pairs of wings. When at rest, they hold their wings flat against their backs. Wing spreads over 10 cm have been recorded. The males have large, curved mandibles (jaws) for holding females during mating. They bite.

### Dobsonfly Larvae



These larvae are dull-colored, very large larvae with strong jaws and legs. Seven to eight pairs of gill filaments, which look like small legs, stick out along the abdomen. They are commonly referred to as "hellgrammites" and are prized by fishermen as bait. They have a strong bite.



### Stoneflies



Stoneflies have long, delicate antennae; transparent, veined (marked with lines) wings; and are usually brown or gray in color. They are weak fliers and are often found resting on the shores of streams.

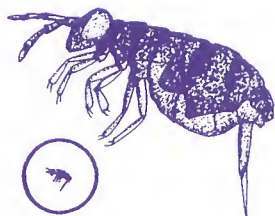
### Stonefly Nymphs



Stonefly nymphs resemble wingless adult stoneflies. Their coloration is usually a combination of yellow, tan, brown and black. They are found under stones and in debris (sticks, leaves, algae) in streams, rivers, and creeks.

### Springtails

Springtails are tiny, wingless insects commonly found on the water's surface near shore. They are named after their unique forked tails that they keep folded beneath their bodies. When disturbed, the tail suddenly springs downward to lift the springtail up into the air.





# VERTEBRATES

Vertebrates are animals with backbones. They comprise 5% of the animal kingdom. Vertebrates include fish, amphibians, reptiles, birds, and mammals.

## FISH

Fish spend their lives entirely in water, breathing by means of gills. They have fins, and their streamlined bodies are usually covered with scales.



## AMPHIBIANS

Amphibians begin life with gills in water and later develop lungs. Their skin is thin, scaleless, smooth or warty, and usually moist. Frogs, toads, and salamanders belong in this group.

### FROGS

Frogs are smooth skinned with long, powerful hind legs. Tree frogs have toes with enlarged tips.



### TOADS

Toads possess a warty skin, large neck glands, and are rarely found moving about during the day. Toads have shorter back legs than frogs have.



### TADPOLES

Tadpoles are the well-known larvae of frogs and toads. They are completely aquatic.



### SALAMANDERS

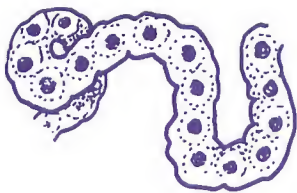
Salamanders also include newts. They have lizardlike bodies but lack claws.



### SALAMANDER LARVAE

These larvae are completely aquatic and possess external gills, which can help you distinguish these larvae from tadpoles.





## AMPHIBIAN EGGS

These eggs appear as strings or clusters of jelly-covered eggs. They are usually attached to pondweeds, twigs, and rocks. Amphibian eggs are usually larger than snail eggs.

## REPTILES

Reptiles breathe by means of lungs. Their skin is dry, scaly, waterproof, and thick. Lizards, snakes, and turtles are familiar reptiles.

### LIZARDS

Lizards have movable eyelids and usually have limbs with clawed toes.

### SNAKES

Snakes have no limbs and have nonmovable, transparent (see-through) eyelids.

### TURTLES

Turtles have body shells into which they can draw their heads and limbs.

## BIRDS

Birds are warm-blooded (able to keep a high body temperature), feathered vertebrates; most are excellent fliers.

## MAMMALS

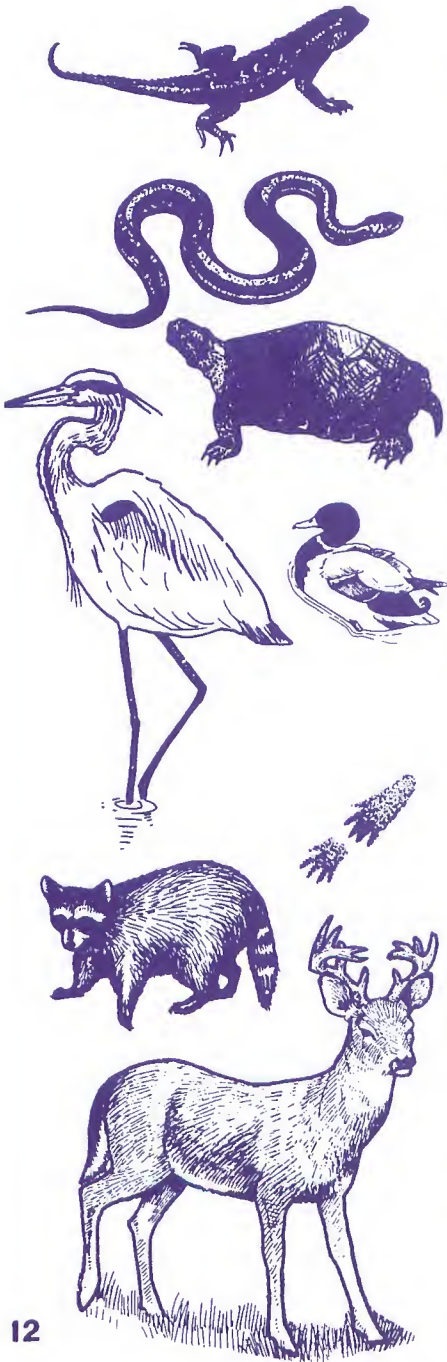
Mammals are warm-blooded, have milk glands for nursing their young, and at some time in their lives possess hair or fur. Most mammals are more active at night (nocturnal) than during the day (diurnal).

### Raccoons

Raccoons are easily identified by their black masks and black-ringed tails. Look for their handlike tracks along muddy shores and stream banks.

### Deer

Deer are large, browsing mammals. Males start to grow antlers in the spring and shed them each year in late winter.



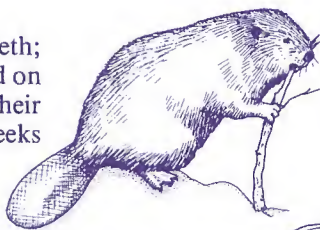
### Mice

Mice are small, gnawing mammals. The house mouse came to America from Europe as a stowaway on early ships.



### Beavers

Beavers are aquatic rodents with large chisel teeth; flat, scaly tails; and webbed hind feet. They feed on bark and rapidly cut down small trees with their teeth. Beavers commonly dam streams and creeks with small trees, limbs, and mud.



### Muskrats

Muskrats are ratlike but chunkier with thick, naked tails. They are good swimmers.



### Shrews

Shrews are the smallest living mammals. The pygmy shrew may weigh less than a tenth of an ounce when fully grown. Mouse-size or smaller, shrews are distinguished by pointed snouts, pinpoint eyes, and tiny ears.



### Bats

Bats are familiar as the only true flying mammals. They possess great maneuvering ability and are often seen flying above lakes, ponds, rivers, and streams at dusk.



**Note:** Sometimes you can find evidence of life even when the particular organisms may not be in sight. **Tracks** of dogs, cats, and humans are commonly found around the edges of ponds and lakes.



## PLANTS

### SHORE PLANTS

Shore plants grow in the moist ground next to bodies of water.

#### Willows

Willows are usually found in wet or moist soils, often growing near bodies of fresh water. They vary in size from small shrubs to large trees. Willows are easily identified by their narrow, pointed leaves.







### **Horsetails**

Horsetails are fernlike plants that often grow near the edges of ponds and streams and in other moist areas. The successive whorls of side stems around the main stem give the plant a shaggy, tail-like appearance. Horsetails feel rough and abrasive.

### **Sedges**

Sedges are grasslike or rushlike plants. They often appear as spikes with grasslike leaves. Their stems are three sided and thus appear triangular in cross section. Sedges generally grow from one-half to one meter tall.

## **EMERGENT PLANTS**

Emergent plants are rooted in shallow water, but have stems and leaves that stand above the water.

### **Cattails**

Cattails are among the most familiar marsh and waterside plants. They grow from one to three meters tall. New plants arise from existing cattails' rootstocks and seeds. The seed clusters form the most characteristic feature of cattails: the dark brown cattail head.

### **Spike Rushes**

Spike rushes are characterized by naked stems, which are topped by a single flower or seed cluster. They usually grow in tight bunches and average from one-half to nearly two meters in height.

### **Bulrushes**

Bulrushes usually appear as great spikes with a flower or seed cluster near their tips. They may grow in water up to three meters deep. The familiar Tule, or great bulrush, grows to a height of four to six meters.

### **Rushes**

Rushes are similar to bulrushes but are smaller. Rushes average about 30 cm in height and usually have hollow stems. There are two forms; one is essentially a naked stem with a sheath at the base; the other bears flattened leaves along its stem. The flowers and seed clusters are found near the top of the stem, as they are on bulrushes.

### **Burreeds**

Burreeds are so named because of their closely packed seed clusters, which resemble large burs. They are close relatives of cattails and are often found growing with them. Burreeds have long, slender, flattened leaves (as do cattails) and vary in height from 30 cm to two meters.



### Water Plantain

Water plantain grows close to pond edges and in other shallow wet places. The pointed, oval leaves all arise from the base of the plant. The flower spray is supported on a long slender stem. The tiny flowers have three petals. Water plantain normally reaches 30 cm to one meter in height.

### Arrowheads

The arrow-shaped leaves give the arrowheads their name. Their three-petaled flowers are arranged in whorls of three on a long, slender stem. Arrowheads bear edible tubers or thickened roots, which have given rise to such names as duck potato and delta potato. Arrowheads grow to 60 cm in height.

### Water Cress

Water cress is a sprawling herb that grows in moist to aquatic places. It was introduced from Europe and is often used in salads. Rooting occurs at the stem nodes or joints, allowing water cress to spread and form dense stands in cold, spring-fed ponds and streams. It has compound leaves (two or more leaflets to a leaf) and white flowers, which are borne on the stem tips.

### Mare's Tail

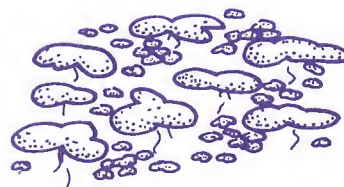
Mare's tail has hollow stems that may be partially or completely submerged. The narrow, short leaves are arranged on the stem in whorls of six to twelve leaves each. The stem varies from 25 cm to 50 cm in height, and a line of stems often arise from a single, ropelike rootstock.

## FLOATING PLANTS

Floating plants include free-floating plants and rooted plants with leaves or stems that float on the water's surface.

### Duckweeds

Duckweeds are known as the smallest flowering plants. Duckweeds have tiny leaflike bodies, which may or may not bear rootlets. The leaflike plants float at the surface and often grow so densely that they look like a green carpet covering the surface of small ponds and ditches. Duckweeds reproduce by breaking apart, in addition to bearing seeds. Two different duckweeds are illustrated. The smaller one is called water meal.





### **Water Ferns**

Water ferns are tiny floating ferns with scalelike lobed leaves and hanging roots. They often form dense reddish-green mats that can cover the entire surface of small ponds and ditches and shade out water plants beneath the surface. They reproduce by breaking apart; the broken fragments then grow into new plants.



### **Water Shamrocks**

Water shamrocks are amphibious ferns that are often found in shallow water of seasonally fluctuating depth. They are named after their cloverlike leaflets. These leaflets are usually found floating on the water surface and are attached by long, slender stalks to a creeping stem rooted in the mud.



### **Yellow Pond Lily**

This is one of the familiar water lilies. It is characterized by large, floating, heart-shaped leaves that are attached by long stems to the base of the plant rooted in the mud. The large yellow flower is tuliplike and bears six to twelve petals. The stems vary from 10 cm to 40 cm long.

### **Water Shield**

The water shield is similar to the pond lily with its long-stemmed floating leaf blades. The leaf blades are oval rather than heart-shaped, however, and the reddish-purple flower is not tuliplike and appears only briefly. The stems range from 30 cm to over a meter in length.



### **Water Milfoils**

Water milfoils have stout stems that vary from one-half to one meter long and bear leaves in whorls of three to six. The milfoils may be partially or completely submerged. The submerged leaves differ in size and shape from the leaves that are above the water. The milfoils' tiny flowers grow near the stem tips.



### **Aquatic Buttercup**

This plant bears the characteristic yellow or white buttercup flower with five petals. Submerged leaves are finely divided, unlike the three-lobed floating leaves. The submerged plant stems appear whitish.

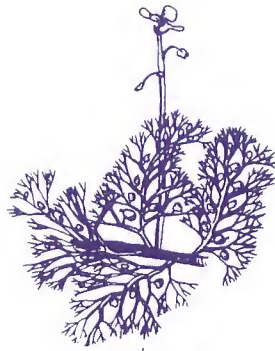


## SUBMERGED PLANTS

Submerged plants grow completely underwater.

### Bladderworts

Bladderworts have long, slender stems that may be submerged or floating. The stems bear leaves so finely branched that they look like hairs. To the finely branched leaf segments are attached the bladderlike traps that give the plants their name. The tiny bladders are effective in trapping minute water animals.



### Filamentous Algae

These plants belong to the green algae group, which is more abundant in ponds and lakes than all the other alga groups combined. The thin green strands of filamentous algae often form dense, submerged mats.



### Elodea

Elodea, or Anacharis, grows entirely submerged as a loosely rooted or free-floating plant. The branched stems are crowded with green, translucent, narrow leaves arranged in whorls of three or more. Elodea spreads with amazing speed and may literally fill up a pond or slow stream and crowd out other plants.



### Hornwort

Hornwort is also known as coon tail because of the dense whorls of leaves arranged about the stem. The narrow, forked leaves bear small teeth or horns along their edges.



### Pondweeds

Pondweeds make up the largest group of truly aquatic seed plants. All of them grow rooted to the bottom and most grow completely submerged except for their flowers. This group shows a wide variation in leaf shape and size. Many pondweeds have long underground stems and tubers that give rise to new plants.



### Water Nymphs

Water nymphs are slender, many-branched plants that grow completely submerged. They have leaves with sawlike (ragged) edges. The leaves broaden at their bases (places where they are attached to the stem). The flowers and seeds are found inside the leaf bases.



## BIBLIOGRAPHY

- Amos, Wm. H. *The Life of the Pond*. New York, London, Toronto: McGraw-Hill Book Co., 1967.
- Comstock, John Henry. *An Introduction to Entomology*. (Rev. Ed.) Ithaca: The Comstock Publishing Co., 1930.
- Fassett, Norman C. *Manual of Aquatic Plants*. New York and London: McGraw-Hill Book Co., 1940.
- Hausman, Leon A. *Beginner's Guide to Fresh-Water Life*. New York: G.P. Putnam's Sons, 1950.
- Mason, Herbert L. *A Flora of the Marshes of California*. Berkeley and Los Angeles: University of California Press, 1957.
- Morgan, Ann Haven. *Field Book of Ponds and Streams: An Introduction to the Life of Fresh Water*. New York and London: G.P. Putnam's Sons, 1930.
- Needham, James G. and Needham, Paul R. *A Guide to the Study of Fresh-Water Biology*. San Francisco: Holden-Day, Inc., 1920.
- Niering, Wm. A. *The Life of the Marsh*. New York, London, Toronto: McGraw-Hill Book Co., 1966.
- Prescott, G.W. *How to Know the Aquatic Plants*. Dubuque: Wm. C. Brown Company Publishers, 1969.
- Reid, George K. *Pond Life: A Guide to Common Plants and Animals of North American Ponds and Lakes*. New York: Golden Press, 1967.
- Ross, Herbert H. *A Textbook of Entomology* (Third Edition). New York, London, Sydney: John Wiley & Sons, Inc., 1967.
- Stebbins, Robert C. *Amphibians and Reptiles of California*. Berkeley: U.C. Press, 1972.
- Usinger, Robert L. *The Life of Rivers and Streams*. New York, Toronto, London: McGraw-Hill Book Co., 1967.





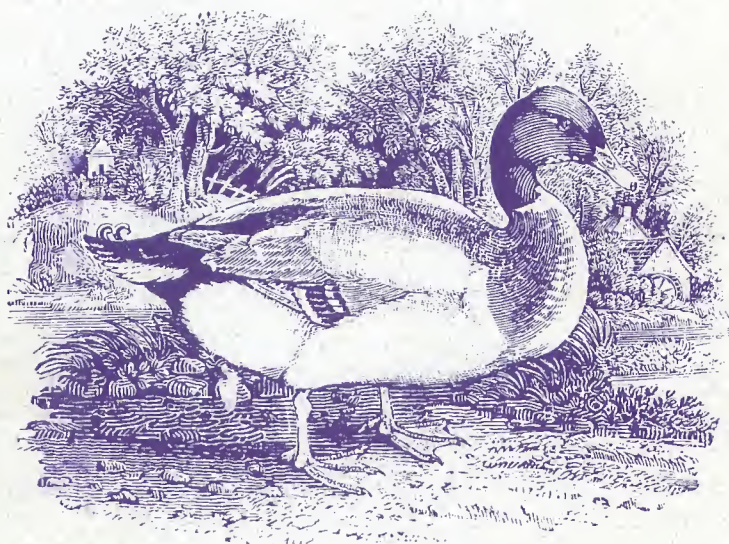
# NOTES



# NOTES







Delta Education  
P.O. Box 915  
Hudson, NH 03051

160-2996